certain conditions, even some quadrupeds show clear traces of it. In the course of his investigations, Prof. Cunningham has brought many new and interesting facts and phenomena to light. Thus in man and the chimpanzee the quality of this lumbar curve is identical; the only differences are its extent and its development. And then among the members of the human race this curve does not appear to be equally prominent; upon some—as the Australian, the Negro, and the Andaman Islander—the curve is by no means so well marked as it is in the European. Not that the absolute degree of curvature is less in these races, but whereas in the European the bodies of the vertebræ are more or less moulded in adaptation to the curve, in the lower races there is to be found no trace of this. With this subject the first part of this memoir is taken up, and the adaptation of the vertebral bodies with reference to the lumbar curve is considered in a first section. The method of making the measurements, and the results derived from them, are given, and special points in connection with the European and several of the lower races (Australian, Tasmanian, Andaman, Negro, and Bushman) are given. Then follow details of the indices of the lumbar vertebræ in the four man-like apes, as well as in nine of the lower apes. The statement that this curve is more marked in the female than in the male is strongly supported by the evidence adduced in this memoir, and it would seem that the vertebral bodies of the female are moulded more in adaptation to the curve than those of the male.

The second section of this part of the memoir treats of the entire lumbar curve as found in man and the apes. The difficulties in the way of securing accurate curvatures of the living spine seem to be insuperable. Parow, who worked hard on this subject, has signally failed; hence the standard of comparison must be sought for in the dead, and the details of how this has been done are given at some length. Racial differences are next discussed, and the development of the spinal curve is treated at great length, with some excellent illustrations. The condition of the lumbar column in the anthropoid apes is next considered. It was, as we have seen, thought that the lumbar curvature did not exist save in man. Goodsir is positive about it. Sir W. Turner at one time was equally so. Sir Richard Owen denies its presence in the gorilla and orang-utan. Huxley was among the first to assert its existence. Broca and Topinard followed. As to the facts to be seen by frozen sections, Cunningham has not succeeded in getting fresh material for the gorilla; but in the case of the chimpanzee the curve differs but little from that in man. In the orang it is feeble, resembling that in man in some respects, and in others differing from that in the chimpanzee. In a gibbon (*Hylobates agilis*) it stands intermediate between the chimpanzee and orang. In some of the monkeys it is also to be found, and even in some quadrupeds.

In a second part of his memoir, Prof. Cunningham, taking advantage of the same anatomical method which enabled him to make such interesting discoveries as to the extent of the curves of the vertebral column, viz. by sections through recently frozen bodies, has been able to advance our knowledge of the topographical anatomy of the orang, chimpanzee, and gibbon, very considerably. Certain relations of distinct morphological importance cannot by any other method be with accuracy ascertained. The question of how far the cerebrum in the anthropoid apes projects backwards in relation to the upper surface of the cerebellum, was at one time a burning question, and, although fairly set at rest, cannot be said to have been unmistakably demonstrated until now; when the whole of the parts were frozen in their places, sections were made, and we have the results in this memoir amply corroborating previous inductions. Sections of the brain *in situ* in the adult male and newly-born child, in the male and female chimpanzee, female orang, and gibbon, are all figured. Other points in the anatomy of the brain, as the condition of the corpus callosum, and of the hippocampus minor are also alluded to, and a few further details as to other visceral anatomy are given.

The memoir forms a quarto volume of some 150 pages, the typography of which is extremely creditable. The woodcut illustrations and plates are excellent, and the publication of this treatise as a Cunningham Memoir marks the appreciation of its value by the Council of the Royal Irish Academy, as the series of its publication—known as the Cunningham Memoirs, because the expenses thereof are defrayed out of the funds left by a Mr. Cunningham—is reserved only for works which the Council believe contribute some new facts to science.

SCIENTIFIC SERIALS

Bulletin de l'Académie Royale de Belgique, August.—Note on the eruptive rocks of the islands of Marion, Prince Edward, Macdonald, and Heard, by A. F. Renard. These insular groups, which stand on the great submarine plateau in the southern regions of the Indian Ocean, are shown to be entirely volcanic, in no way connected either with the Madagascar group or with the lands of the South Polar seas. Marion and Prince Edward, which were visited and partly explored by Mr. Buchanan, of the *Challenger* Expedition, consist of old plutonic formations, such as feldspar basalts and much more recent black and other lavas. Heard, discovered in 1853 by the American captain Heard and also visited by the *Challenger*, is largely covered with a black volcanic sand formed of grains of magnetite and augite. Elsewhere occur more recent lava formations, which show no trace of the erosive action exercised by the sands on the older rocks. All the specimens collected here belong mainly to the group of feldspar basalts.—On the presence in Belgium of *Bothriocephalus latus*, Bremser, by Edouard van Beneden. A few recent instances are recorded of the presence in Belgium of this human parasite, which is common enough in Holland.—Experimental researches on the influence of magnetism on the phenomenon of polarisation in dielectrics, by Edmond van Aubel. In this second communication the author gives the result of fresh experiments, showing how, by means of a specially-constructed electro-magnet, the electric field which interfered with previous researches may be completely eliminated, while preserving an intense magnetic field. The electro-magnet here described may also be used in ordinary physical experiments, wherever it is necessary to ascertain whether the phenomena observed with the Ruhmkorff and other electro-magnets are due to magnetism and not to the electric field or to the heat of the current traversing the bobbins.

SOCIETIES AND ACADEMIES

PARIS

Academy of Sciences, November 2.—M. Jurien de la Gravière, President, in the chair.—Fresh communication on rabies, by M. Louis Pasteur. (For summary of this report, see p. 30).—Note on the unequal flow of gases, by M. Haton de la Goupillière. Having, in previous papers, given a complete analytical solution of the various problems connected with this subject, the author here determines the true character of his formulas in their relation to experimental applications.—Remarks on M. Fontaine's report concerning his experiments on the transport of power by electricity, by M. Marcel Deprez. It is pointed out that M. Fontaine's method, which replaces the generator and receiver by a series of machines coupled together in sufficient number to produce the desired effect, so far from being based on any new principle, is the same as that proposed by all electricians who have sought to obtain high tensions without having recourse to the construction of the special machines first suggested by the author. The means employed by M. Fontaine to control simultaneously the four series of generators is also stated greatly to resemble that described in a patent taken out on April 28, 1885, by M. Deprez.—Experimental researches connected with the cerebral functions, by M. Brown-Séquard. These researches have been undertaken in order to show how varied and numerous are the purely dynamic effects proceeding from influences exercised on the encephalon by the sensitive nerves, and on the motor nerves by the nervous centres. Experiments carried on for seven or eight years lead to the general conclusion that all the motor nerves, and nearly all the excitable parts of the nervous centres, may have their excitability greatly modified, even under the influence of remote and slight irritations of the greater part of the nervous system.—On the atomic weight of the oxide of gadolinium, by M. A. E. Nordenskjöld. This compound is not a simple oxide, but consists of the three closely-related oxides of yttrium, erbium, and ytterbium, all with very different atomic weights. Nevertheless, even when derived from quite different minerals occurring in localities far removed from each other, it is here shown to possess a constant atomic weight. On the other hand, this substance is not a true chemical combination, but an isomorphous mixture, thus presenting a new phenomenon in chemistry and mineralogy. It is the only known instance of three isomorphous substances of the class which must still be regarded as

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elements that are found in Nature not only always together, but always together in like proportions. — On a new function of the otocysts in the invertebrates, by M. Yves Delage. A long series of researches recently conducted at the laboratory of Roscoff leads to the conclusions that these organs, occurring chiefly in the higher crustaceans and mollusks, serve not only as organs of hearing, but also, and perhaps mainly, as organs of locomotion, thus corresponding to the labyrinth of higher animals.—On *Gymnodinium polyphemus*, P., by M. Pouchet. Although hitherto regarded as a member of the vegetable kingdom, this organism presents the remarkable peculiarity of possessing an organ of vision of a somewhat complicated type. It is a headless Peridinian, occurring on the French coast, and, like all Peridinians, feeds on vegetables by endosmotic absorption. The eye, which always occupies a uniform position, is formed of two parts—a true crystalline and a true choroid—and its real character cannot be mistaken, resembling, as it does, in the most striking manner, the eyes of certain worms and Turbellariæ.—Saturation of selenious acid by the bases, and acidimetric analysis of this acid, by M. Ch. Blarez.—On the heat of neutralisation of the homologous or isomerous monobasic acids, by MM. H. Gal and E. Werner. The heat of neutralisation, already determined by Berthelot and Louguinine for formic, butyric, and some other fatty acids, is here determined, together with the heat of dissolution for others, such as isobutyric, isopropylacetic, trimethylacetic, caproic, &c.—Synthesis of pentamethylenediamine, of tetramethylenediamine, of piperidine, and of pyrrolidine, by M. A. Ladenburg.—On two new chlorurretted derivatives of methylbenzoyl, by M. Henri Gautier. The process is explained by which the author has obtained a trichlorurretted and a bichlorurretted methylbenzoyl.—A new reaction of the chloride of aluminium: syntheses of the fatty series, by M. Alph. Combes. The chloride of aluminium, which has effected so many syntheses in the aromatic series, is here for the first time systematically applied to the production of substances of the fatty series.—Hæmatoscopy, a new method of analysing blood, based on the employment of the spectroscope, by M. Hénocque. This method, already tested on 200 subjects, comprises two classes of observations: (1) determination of the quantity of oxyhæmoglobin, or active colouring-matter of the blood, by means of instruments here figured, and named "hæmatoscopes" and "hæmatospectroscopes"; (2) duration of the reduction of the oxyhæmoglobin estimated by spectroscopic examination.—Fresh remarks on the stem of Poroxylon, a fossil Gymnosperm of the Carboniferous epoch, by MM. C. Eg. Bertrand and B. Renault. By comparing together homologous sections of stems of the same order but of different periods, the authors have succeeded in determining the variations introduced by time into the normal stem of this plant.—On a fundamental condition of equilibrium for the living cells of plants, by M. Léo Errera.—Petrographic study of a carboniferous diabase from the neighbourhood of Dumbarton, by M. A. Lacroix. The rock here under consideration, a vertical greenish stratum traversing the old red sandstone, presents an opportunity of studying in a small space the various structural forms which a volcanic rock may assume under the influence of a progressive cooling process.—The dislocations of the globe during recent periods, their lines of fracture, and the conformation of the continents, by M. Jourdy.—On the unity of forces in geology (continued), by M. H. Hermite. It is argued that simple oscillations of sea-level, produced by meteorological causes, would suffice, without having recourse to internal agencies, to explain the *apparent* oscillations of the land in relation to latitude, which are characteristic of the Quaternary epoch.—On the pathologic physiology of the supra-renal capsules, by M. Guido Tizzoni.—On the contractions determined by the currents of polarisation of the living tissues, by MM. Onimus and Larat. The experiments here described place beyond doubt the existence and energy of the currents of polarisation in our tissues, thus exposing the errors of the fundamental experiments carried out by Du Bois-Raymond and most German physiologists.—Note on a remarkable substance collected at Luchon on July 28, 1885, after the fall of a thunderbolt, by M. Stanislas Meunier.

STOCKHOLM

Academy of Sciences, October 14.—Contributions to the anatomy and histology of the limnivore Annelids, by Dr. A. Wirén.—On the electric nature of drift-snow, by Prof. A. Holmgren.—On the work and activity of the Ornithological Committee of the Academy for studying birds of passage, &c., by Prof. F. A. Smitt.—On new acquisitions to the Botanical Garden of the Bergian donation, by Prof. V. Wittrock.—On the lichens of the islands of the west coast of Sweden, by Dr. P. Hellborn.—Contributions to the anatomy of the Marcgraviaceæ, by Hr. H. O. Juel.—Studies of the influence of woods and forests on the climate of Sweden, by Dr. Hamberg.—On remains of Dryasoctopetala, L., in calcareous tuff near Vadstena, by Prof. A. G. Nathorst.—On combinations of phenylmethyl-triazol, by Hr. J. A. Bladin.—On the orbit of the comet 1877, VII., by Dr. R. Larsén.—Demonstration of the proposition that the complete integral of differential equations of the *n*th order contains *n* arbitrary constants, by Dr. G. Eneström.

BOOKS AND PAMPHLETS RECEIVED

Chemical Arithmetic, 2nd edition: S. Lupton (Macmillan).—Charter, By-Laws, and List of Members of the Institution of Civil Engineers (25, Great George Street).—Minutes of Proceedings of the Institution of Civil Engineers, vols. lxxxiii. to lxxxvi (25, Great George Street).—Lectures and Essays, 2nd edition: W. K. Clifford (Macmillan).—The Rotifera or Wheel Animalcules, part 6: C. T. Hudson and P. H. Gosse (Longmans).—Calendar of University College of North Wales, 1886-87 (Cornish, Manchester).—Persia as it is: Dr. C. J. Wills (S. Low).—High Life and Towers of Silence: Mrs. Fred Burnaby (S. Low).—Smithsonian Report, 1884, part 2 (Washington).—Proceedings of the U.S. National Museum, vol. viii., 1885 (Washington).—Practical Dynamo-Building: F. W. Walker (Iliffe and Son).—Journal of the Royal Agricultural Society, October (J. Murray).—Rendiconto dell' Accad. delle Scienze Fisiche e Matematiche, anno xxii., xxiii., xxiv., 1883-84-85; anno xxv., fasc. 1, 2, 3 (Napoli.)—Nature Musings on Holy-days and Holidays: Rev. N. Curnock (Woolmer).—Commercial Organic Analysis, vol. ii.: A. H. Allen (Churchill).—A Synopsis of Elementary Results in Pure Mathematics: G. S. Carr (Hodgson).—Our Temperaments: A. Stewart (Lockwood).—The Coming Deluge of Russian Petroleum: C. Marvin (Anderson).—Methods of Analysis of Commercial Fertilisers (Washington).—Publications of the Leander McCormick Observatory of the University of Virginia, vol. i., part 3, Nebula of Orion, 1885.

CONTENTS

PAGE

Letters and Journals of W. Stanley Jevons . . . 25
General Pathology 26
Plane Geometry 27

Our Book Shelf :—

"American Journal of Mathematics" 28
Casey's "Sequel to the First Six Books of the Elements of Euclid" 28
Lilley's "Geometrical Drawing for Army Candidates" 28

Letters to the Editor :—

The Enormous Loss from Ox-Warble.—**Dr. John Wrightson** 29
"Lung Sick."—**E. J. Dungate** 29
The Beetle in Motion.—**C. J. G.** 29
Meteors.—**Rev. John Hoskyns-Abrahall; E. Parry** 29
Influence of Wind on Barometric-Readings. By **Prof. Cleveland Abbe** 29
M. Pasteur's Treatment of Rabies 30
Report on the Charleston Earthquake. By **Prof. T. C. Mendenhall.** (*With a Map*) 31
The Similarities of the Physical Geography of the Great Oceans. By **J. Y. Buchanan** 33
Notes 34

Our Astronomical Column :—

Stellar Photography at Harvard College 37
Astronomical Phenomena for the Week 1886 November 14-20 37
The Erosion of the English Coasts. By **W. Topley** 37
Observations on Heredity in Cats with an Abnormal Number of Toes. By **Edward B. Poulton.** (*Illustrated*) 38
Lighthouse Illuminants, I. By **A. Vernon Harcourt, F.R.S.** 41
The Lumbar Curve in Man and Apes 46
Scientific Serials 47
Societies and Academies 47
Books and Pamphlets Received 48

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